

## **REMARKS**

### **Status of the Claims**

Claims 4, and 7 - 9 are presently cancelled. Claims 1, 5, 6, 13, 18, and 19 are presently amended to further define the invention. Amendments to claims 13 and 19 are supported by the specification as filed, in particular, see, paragraphs [0065] - [0068] and Figures 15 – 17. New claims 25 - 30 are supported by the specification as filed, in particular, paragraphs [0033], [0035], [0037], [0042], [0043], and Table 1 (Page 10). No new matter is introduced by the instant claim amendments.

### **Declaration under 37 CFR §1.132**

Applicant submits herewith a declaration stating that the cited documents, Bauer *et al.*, “Ge-Sn semiconductors for band-gap and lattice engineering” (Bauer I) and Bauer *et al.*, “Tunable band structure in diamond-cubic tin-germanium alloys grown on silicon substrates,” (Bauer II), are applicants own work, disqualifying the two references, cited under 35 USC §102(a), as prior art against the instant claims.

### **1. Rejection of Claims under 35 USC §102(b)**

For a claim to be anticipated by the prior art, under 35 USC §102, the reference must recite all limitations of the allegedly anticipated claim. “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) MPEP 2131.

#### **a. Rejection of Claims 1-5 and 10**

Claims 1-5 and 10 presently stand rejected under 35 USC §102(b) for allegedly being anticipated by He et al. (US 6,037,614). Claim 1 is presently amended to further define the invention by incorporating the limitations of original claim 7 therein. Claim 1 presently recites a  $\text{Sn}_{1-x}\text{Ge}_x$  layer formed directly on a substrate. Further, Claim 1 also recites that the substrate consists essentially of silicon.

He does not teach or suggest either the limitation that the  $\text{Sn}_{1-x}\text{Ge}_x$  layer is formed directly on a substrate or that the substrate consists essentially of silicon. For example, see Col. 5, lines 24 – 51, Col. 6, lines 62 – 67, and Figure 3; He uses a Ge buffer layer between the silicon substrate and the GeSn layer. Therefore, He does not disclose or suggest all the present limitations of Claim 1 or any of dependent Claims 2-5 and 10. Applicants respectfully request reconsideration and withdrawal of the rejection.

**b. Rejection of Claims 13-15**

Claims 13-15 presently stand rejected under 35 USC §102(b) for allegedly being anticipated by Soref *et al.* (US 5,548,128). Claim 13 is presently amended to further define the invention as discontinuous Gn-Sn quantum structures formed over a substrate. In contrast, Soref describes continuous layers of  $\text{Sn}_{1-x}\text{Ge}_x$  (see, *e.g.*, Figure 2 and Col. 2, ll. 35 – 40 and 41 – 58, and Col. 3, ll. 9 - 12). Applicants submit that Soref does not teach or suggest all the present limitations of claim 13 or dependent claims 14 and 15, and respectfully request reconsideration and withdrawal of the rejection.

**2. Rejection of Claims under 35 USC §102(a)**

**c. Rejection of claims 1 and 7-8**

Claims 1 and 7-8 stand rejected under 35 USC §102(a) as allegedly being anticipated by “Ge-Sn semiconductors for band-gap and lattice engineering” (Bauer I). In light of the presently submitted declaration establishing Bauer I as Applicant’s own work, the cited reference is not available as prior art against the instant claims. Applicant submits that the rejection has been rendered moot and respectfully request withdrawal of the rejection.

**d. Rejection of claims 17-23**

Claims 17-23 stand rejected under 35 USC §102(a) as allegedly being anticipated by “Tunable band structure in diamond-cubic tin-germanium alloys grown on silicon substrates,” (Bauer II). In light of the presently submitted declaration establishing Bauer II as Applicant’s own work, the cited reference is not available as prior art against the instant claims. Applicant submits that the rejection has been rendered moot and respectfully request withdrawal of the rejection.

### **3. Rejection of Claims under 35 USC §103 (a)**

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). MPEP 2142.

#### **e. Rejection of Claim 9**

Claim 9 stands rejected under 35 USC §103(a) over “Ge-Sn semiconductors for band-gap and lattice engineering” (Bauer I) in combination with Bader (US 6,849,878). In light of the presently submitted declaration establishing Bauer I as Applicant's own work, the cited reference is not available as prior art against the instant claims. As such, Applicant submits that the present rejection is improper for failing to teach or suggest all the present claim limitations. In particular, Bader does not describe the claim limitations of Claim 1. Applicant respectfully requests reconsideration and withdrawal of the rejection.

#### **f. Rejection of Claim 24**

Claim 24 stands rejected under 35 USC §103(a) over “Ge-Sn semiconductors for band-gap and lattice engineering” (Bauer I) in combination with Soref (US 5,548,128). In light of the presently submitted declaration establishing Bauer I as Applicant's own work, the cited reference is not available as prior art against the instant claims. As such, Applicant submits that the present rejection is improper for failing to teach or suggest all the present claim limitations. In particular, Soref does not describe, at least, introducing into a chamber a combination comprising  $\text{SnD}_4$  and  $\text{Ge}_2\text{H}_6$ . Applicant respectfully requests reconsideration and withdrawal of the rejection.

#### **g. Rejection of Claims 11-12**

Claims 11 and 12 are each dependent claims of presently amended Claim 1. Claim 1 presently recites that the  $\text{Sn}_{1-x}\text{Ge}_x$  layer is formed directly on the substrate, and that the substrate consists essentially of silicon.

He does not teach or suggest the limitation that the  $\text{Sn}_{1-x}\text{Ge}_x$  layer is formed directly on a substrate consisting essentially of silicon (*supra*). Soref does not cure this deficiency. Soref teaches the use of a buffer layer between the silicon substrate and SnGe layer, see Figures 1 and 2 therein. Layers #19 and #21 are each buffer layers between the substrate (#1) and any of the GeSn layers (#13' and #13). Neither of the buffer layers in Soref is a GeSn layer (see, Col. 3, lines 25 – 45). Applicants submit that the combination of He and Soref does not disclose or suggest all the present limitations of claims 11 and 12. Applicants respectfully request reconsideration and withdrawal of the rejection.

#### **h. Rejection of Claim 16**

Claim 16 is a dependent claim of presently amended Claim 13. Claim 13 is presently amended to further define the invention as discontinuous quantum structures. Soref only teaches continuous layers of  $\text{Sn}_{1-x}\text{Ge}_x$  (see, Abstract and as illustrated in Figures 1 and 2). Yamaguchi is silent with respect to SnGe layers and does not correct the deficiencies of Soref. Therefore, the combination of Soref and Yamaguchi does not disclose or suggest all the present limitations of claim 16. Applicants respectfully request reconsideration and withdrawal of the rejection.

## **CONCLUSION**

Applicants respectfully submit that all requirements of patentability have been met. Allowance of the claims and passage of the case to issue are therefore respectfully solicited. If the Examiner has any questions or comments regarding this Amendment, they are encouraged to contact the undersigned as indicated below.

Respectfully submitted,

Date: October 4, 2007

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